the first direction, and has a probe opposed to the straight track and capable of being displaced in the second direction, wherein when the clearance between the tip end of the probe and the straight track is taken as N, the following equation is satisfied

$$(N - \alpha) \leq L$$

in which $0 < \alpha \leq 100$ μm.

In order to measure the linearity of an Ori-Fla by using the linearity measuring apparatus for a wafer Ori-Fla in accordance with the first mode of the present invention, the platform on which a wafer is not mounted is first moved in the first direction so as to be opposed to the block. Next, a wafer is mounted on the top surface of the platform, and the wafer is allowed to abut against the flat face of block so that the Ori-Fla is substantially parallel with the flat face. Thereafter, the wafer is fixed on the platform by the wafer fixing means. Next, the platform is moved in the first direction, by which the Ori-Fla is brought into contact **range** with the probe of the **measuring device, the probe is then lowered to contact the ORI-FLA.** Further, the platform is moved in the first direction, by which the probe of **the measurement device resides on the Ori-Fla, with the probe output signal registering as deflection on the measurement device display. By reading the deflection registered on the measurement device display, the linearity of the Ori-Fla can be provided quantitatively as numerical data.**

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of one embodiment of a linearity measuring apparatus in accordance with the present invention, showing a state before a wafer is mounted on a platform;

FIG. 2 is a plan view corresponding to FIG. 1, showing a state in which a wafer is mounted on a platform and a first Ori-Fla of the wafer is allowed to abut against a block;

FIG. 3 is a plan view corresponding to FIG. 1, showing a state in which a block is separated from an Ori-Fla of wafer;

FIG. 4 is a plan view corresponding to FIG. 1, showing a state in which a platform is moved together with a wafer to **bring the Ori-Fla into range of the measurement device;**

FIG. 5 is a sectional view taken along the line A-A of FIG. 2;

FIG. 6 is a sectional view taken along the line B-B of FIG. 3;

FIG. 7 is a sectional view taken along the line C-C of FIG. 4; and

FIG. 8 is a plan view of a wafer in which the fabrication accuracy of Ori-Fla is poor.
*** A dial indicator is used for illustrative purposes.**

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will now be described with reference to the accompanying drawings.

As shown in FIGS. 1 and 5, three straight tracks 11a such as linear motion guides (LM guides) are formed in a base 11 of a linearity measuring apparatus 10 so as to extend in a first direction, and a platform 13 engages with these straight tracks 11a via engagement means 12. This engagement means 12 has a fixed rail 14 and a movable rail 16 as shown in detail in FIG. 5. The fixed rail 14 is fixed by being inserted in the straight track 11a, and the movable rail 16 is fixed by being inserted in a groove 13a formed in the bottom surface of the platform 13 and is fitted on the fixed rail 14 via needle-shaped rollers 17. The fixed rail 14 is formed with a convex portion 14a that projects upward and extends in the lengthwise direction of the rail 14. The movable rail 16 is formed with a concave portion 16a that has a cross-sectional shape corresponding to the convex portion 14a and a size larger than the convex portion 14a and extends in the lengthwise direction of the rail 16. The needle-shaped roller 17 is configured so as to rotatively slide on the movable rail 16 and rolls on the fixed rail 14. Thereby, the movable rail 16 is configured so as to move in the first direction along the fixed rail 14 or the straight track 11a together with the platform 13. The top surface of the platform 13 is formed so as to be flat so that a wafer 18 is mounted. The wafer 18, having a diameter of 50 to 300 mm, has a first Ori-Fla 18a and a second Ori-Fla 18b. The number of **straight** tracks is not limited to three, and may be one, two, **or more.** Also, the fixed rail may be formed with a concave portion, not the convex portion, and the movable rail may be formed with a convex portion, not the concave portion. Further, between the fixed rail and the movable rail, steel balls or sliding bearings may be interposed instead of the needle-shaped rollers.

On the other hand, a block 19 is provided on the base 11 with a predetermined first clearance L (FIG. 1) being provided with the straight track 11a in a second direction perpendicular to the first direction (FIGS. 1 and 5). This block 19 is installed to the base 11 via release means 21. The block 19 is formed with a flat face 19a that is parallel with the first direction and perpendicular to the top surface of the base 11 so that the first Ori-Fla 18a or the second Ori-Fla 18b of the wafer 18 can abut against the flat face 19a. The first clearance L is a clearance

between the block 19 and the straight track 11a of the three straight tracks 11a which is closest to the block 19. This first clearance L is formed so as to be greater than the distance from the straight track 11a closest to the block 19 to the face of the platform 13 opposed to the block 19. As shown in detail in FIGS. 5 and 6, the release means 21 has a release body 22 installed on the base 11 behind the block 19, a rod 23 one end of which is inserted and fixed in the block 19 and the other end of which is slidably inserted in the release body 22, and an operating lever 24 the substantially central portion of which is swayingly provided on the release body 22 via a first pin 31 and the lower end of which is connected to the other end of the rod 23 via a second pin 32.

A helical compression spring 26 is provided around the rod 23. One end of this spring 26 is pressed on the block 19, and the other end thereof is pressed on the release body 22. Further, a helical tension spring 27 is provided between the release body 22 and the operating lever 24. The lower end of this spring 27 is fixed to a lower pin 28 fixed to the release body 22, and the upper end thereof is fixed to an upper pin 29 fixed to the operating lever 24. The lower pin 28 is located on the vertical line passing through the first pin 31, and the upper pin 29 is located at an upper position separated a predetermined distance from the first pin 31 in the lengthwise direction of the operating lever 24. The operating lever 24 is configured so as to be swayed between a first position (FIG. 5) at which the first Ori-Fla 18a or the second Ori-Fla 18b is allowed to abut against the flat face 19a of the block 19 and thereby the wafer 18 can be positioned and a second position (FIG. 6) at which the block 19 is separated from the first Ori-Fla 18a or the second Ori-Fla 18b, that is, the block 19 goes apart from the straight track 11a.

The spring constant of the helical tension spring 27 is set so as to be larger than that of the helical compression spring 26. Therefore, when the operating lever 24 is operated to the second position, the elastic force of the helical tension spring 27 overcomes that of the helical compression spring 26, so that the helical tension spring 27 can temporarily be held at the second position. Reference numeral 33 in FIGS. 5 and 6 denotes a flat bar fixed to the base 11 in parallel with the straight track 11a. This flat bar 33 has a function such that when the operating lever 24 is operated to the first position (FIG. 5), the flat face 19a of the block 19 abuts against the flat bar 33, by which the flat face 19a of the block 19 is corrected so as to become parallel with the straight track 11a. Also, reference numeral 24a denotes an elongated hole formed in a lower end portion of the operating lever 24 so that the second pin 32 is inserted in this elongated hole

24a.

On the other hand, the platform 13 is provided with wafer fixing means 34 for fixing the wafer 18 in a state in which the wafer 18 is mounted on the platform 13 (FIGS. 1 and 5). This wafer fixing means 34 includes a suction port 36 for attracting and fixing the wafer 18, which is formed in the top surface of the platform 13, a suction hole 37a one end of which communicates with the suction port 36, which is formed in the platform 13, a suction pipe 37b one end of which is connected to the other end of the suction hole 37a and the other end of which is connected to a vacuum **supply** (not shown), a switching valve (not shown) for switching the suction port 36 to a negative pressure or the atmospheric pressure, which is provided in the suction pipe 37b, and a selector switch 38 for turning on/off the switching valve. The suction hole 37a and the suction pipe 37b constitute a suction passage 37. The switching valve, which is an electromagnetic valve for 3-port 2-position switching, is configured so that when the selector switch 38 is turned on, the suction port 36 communicates with the vacuum **supply** to provide a negative pressure, and when the selector switch 38 is turned off, the suction port 36 communicates with the atmosphere to provide the atmospheric pressure. Also, a **measurement device** 39 having a probe 39a at the tip end of a spindle 39d is installed on the base 11 (FIGS. 1 to 4 and 7). This **measurement device** 39 is located on the base 11 with a predetermined second clearance M (FIG. 1) being provided with the block 19 in the first direction, and is configured so that the probe 39a can be displaced in the second direction in such a manner as to be opposed to the straight track 11a. At the tip end of the probe 39a, there is provided a (**e.g.**) steel ball 39b capable of rolling on the first Ori-Fla 18a or the second Ori-Flb 18b. Taking a clearance between the tip end of the probe 39a and the straight track 11a as N, the dial gauge 39 is fixed on the base 11 so that the following equation (1) is satisfied.

$$(N - \alpha) \leq L \quad \ldots (1)$$

In Eq. (1), $0 < \alpha \leq 100$ μm, preferably $40 < \alpha \leq 60$ μm.

A method for using an apparatus 10 for measuring the linearity of the first Ori-Fla 18a of the wafer 18, which is constructed as described above, will be described with reference to FIGS. 1 to 7.

First, the selector switch 38 is turned off, and the platform 13 on which the wafer is not mounted is moved in the first direction so that the platform 13 is opposed to the block 19. Then, the operating lever 14 is operated to the first position (FIG. 5) to cause the flat face 19a of the block 19 to abut against the flat bar 33 (FIG. 1). Next, a wafer 18 is mounted on the top surface of the

platform 13, and the first Ori-Fla 18a of the wafer 18 is caused to abut against the flat face 19a of the block 19 in such a manner as to be parallel with the flat face 19a (FIGS. 2 and 5). In this state, the selector switch 38 is turned on to cause the suction port 36 to communicate with the vacuum **supply**, by which the wafer 18 is attracted and fixed onto the platform 13. Next, the operating lever 24 is turned from the first position (FIG. 5) to the second position (FIG. 6) to move the block 19 in the second direction so as to be separated from the wafer 18 (FIGS. 3 and 6). In this state, the platform 13 on which the wafer 18 is mounted and fixed is moved in the first direction, by which the first Ori-Fla 18a is brought into contact under **range** with the tip end of the probe 39a of the **measurement device** 39 (FIGS. 4 and 7). When the platform 13 is further moved in the first direction, the steel ball 39b at the tip end of the probe 39a of the **measurement device** 39 rolls on the first Ori-Fla 18a, and the **display** 39c of the **measurement device** 39 deflects. The deflection shown on the **display** 39c of the **measurement device** 39 when the steel ball 39b at the tip end of the probe 39a of the **measurement device** 39 rolls from one end of the first Ori-Fla 18a to the other end thereof is read. The acceptability or non-acceptability of linearity of the first Ori-Fla 18a of the wafer 18 can be judged according to whether or not the deflection is within, for example, 25 μm. When the linearity of the first Ori-Fla 18a of another wafer 18 is measured succeedingly, the selector switch 38 is turned off, and the wafer 18 having been **just** subjected to measurement is removed from the platform 13. Thereafter, the above-described procedure is repeated. In this manner, the linearity of the first Ori-Fla 18a of the wafer 18 can be measured accurately in a short period of time.

Although the linearity of the first Ori-Fla is measured by using the linearity measuring apparatus in the above-described embodiment, the linearity of the second Ori-Fla may **also** be measured **by the same sequential method**.

Furthermore, in the above-described embodiment, **the deflection registered on the measurement device display** is read visually. However, if the linearity measuring apparatus is configured so that the deflection data of the **measurement device display** can be outputted as an **electronic** signal, the Ori-Fla linearity data for each wafer can be stored by connecting the **electronic** signal to the input of a computer, and also the acceptability or non-acceptability of **the** linearity of **the** Ori-Fla can be **analyzed/determined** by means of the computer when the apparatus of the present invention is automated.

The present invention achieves the following effects: as described above, according to the present invention, the platform is moved in the first direction so as to be

opposed to the block, a wafer is fixed on the platform so that the Ori-Fla abuts against the block, **the block is retracted**, and the platform is moved in the first direction so that the Ori-Fla is brought into **measurement range** with the probe of the **measurement device**, **and the probe is lowered until contact with the ORI-FLA is made.** Therefore, by reading the deflection **displayed on the measurement device** when the **ORI-FLA is moved** from one end to the other end thereof, the linearity of Ori-Fla can be displayed quantitatively as numerical data so that the acceptability or non-acceptability of linearity of the Ori-Fla of the wafer can be **determined**. As a result, the linearity of the Ori-Fla of the wafer can be measured accurately in a short period of time.

Also, if the wafer fixing means has the suction port for attracting and fixing the wafer, the suction passage communicating with the suction port, and the switching valve for switching the suction port to a negative pressure or the atmospheric pressure, the wafer can be fixed on the platform by a very simple operation without damage to the wafer.

Also, if the release means for moving the block in the second direction in which the block **retracts** from the straight track is provided, the Ori-Fla moves in a state of being separated from the block when the platform with the wafer being mounted thereon is moved in the first direction. As a result, the wafer is not damaged.

Further, if the linearity measuring apparatus is configured so that the deflection data of the **measurement device display** can be outputted as an **electronic** signal, the Ori-Fla linearity data for each wafer can be stored by connecting the **electronic** signal to the input of a computer, and also the acceptability or non-acceptability of linearity of Ori-Fla can be **analyzed/determined** by means of the computer when the apparatus of the present invention is automated.

WHAT IS CLAIMED IS:

1. A linearity measuring apparatus for a wafer orientation flat, comprising:

a base in which **one, two, or more** straight tracks are formed in a first direction;

a platform which is configured so as to be movable in said first direction by being engaged with said straight track via engagement means, and is further provided with a top surface formed so as to be flat to mount a wafer having an orientation flat;

a block which is installed on said base with a predetermined first clearance L being provided with the straight track in a second direction perpendicular to said first direction, and has a flat face against which the

orientation flat of said wafer mounted on said platform abuts and which is parallel with said first direction;

wafer fixing means provided in said platform to fix said wafer in a state in which said wafer is mounted on said platform; and

a **measurement device** which is installed on said base with a predetermined clearance M being provided with said block in said first direction, and has a probe opposed to said straight track and capable of being displaced in said second direction, wherein

when a clearance between the tip end of said probe and said straight track is taken as N, the following equation is satisfied

$$(N - \alpha) \leq L$$

in which $0 < \alpha \leq 100$ μm.

2. The linearity measuring apparatus according to claim 1, wherein said wafer fixing means has a suction port formed in said platform to attract and fix said wafer, a suction passage communicating with said suction port, and a switching valve provided in said suction passage to switch said suction port to a negative pressure or the atmospheric pressure.

3. The linearity measuring apparatus according to claim 1, wherein release means for moving said block in said second direction in which said block goes apart from said straight track is provided.

4. The linearity measuring apparatus according to claim 1, wherein deflection data **displayed on the measurement device** can be outputted as an electrical signal.

5. The linearity measuring apparatus according to claim 1, wherein said apparatus can be applied to a wafer having a diameter in the range of 50 to 300 mm.

ABSTRACT OF THE DISCLOSURE

Straight tracks 11a are formed in a first direction on a base 11. The top surface of a platform 13 is formed so as to be flat to mount a wafer 18 having an Ori-Fla 18a, and the platform is moved in the first direction by being engaged with the straight tracks via engagement means 12. A block 19 having a flat face 19a against which the Ori-Fla of the wafer abuts and which is parallel with the first direction is installed with a first clearance L being provided with the straight track in a second direction perpendicular to the first direction. Wafer fixing means 34 for fixing the wafer in a state in which the wafer is mounted on the platform is provided in the platform, and a **measurement device** 39 having a probe 39a opposed to the straight track and capable of being displaced in the second direction is installed with a second clearance M being

provided with the block in the first direction. When a clearance between the tip end of the probe and the straight track is taken as N, the relationship of $(N - \alpha) \leq L$ exists, in which $0 < \alpha \leq 100$ μm. By this configuration, the linearity of the Ori-Fla can be measured accurately in a short period of time.

FIG. 1

FIRST DIRECTION

SECOND DIRECTION

FIG. 2

FIRST DIRECTION

SECOND DIRECTION

FIG. 3

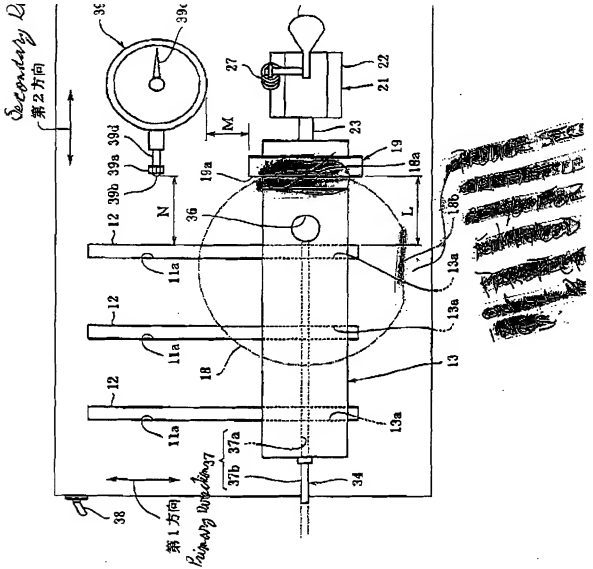
FIRST DIRECTION

SECOND DIRECTION

FIG. 4

FIRST DIRECTION

SECOND DIRECTION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18a
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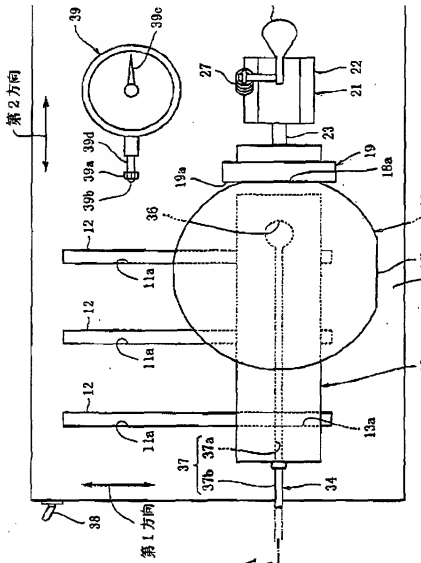
38
第1方向
Rigidity direction

ML6227(1/8)



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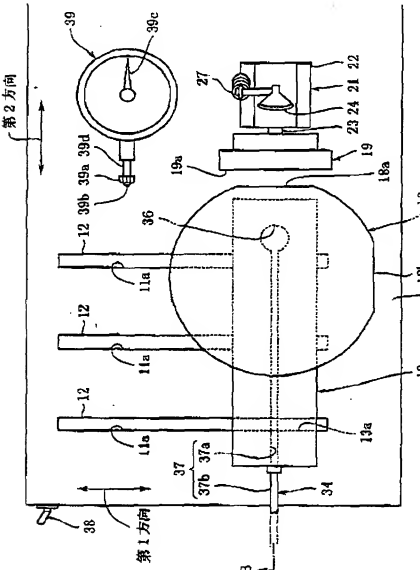

ML6227(3/8)

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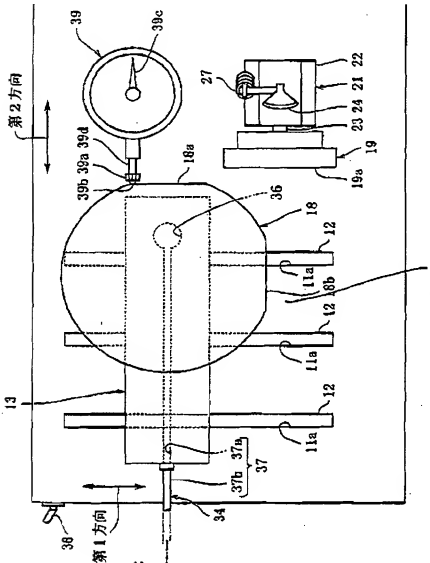

ML6227(4/8)

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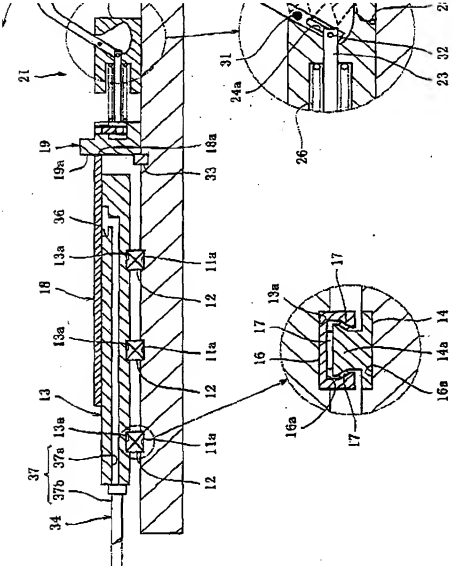
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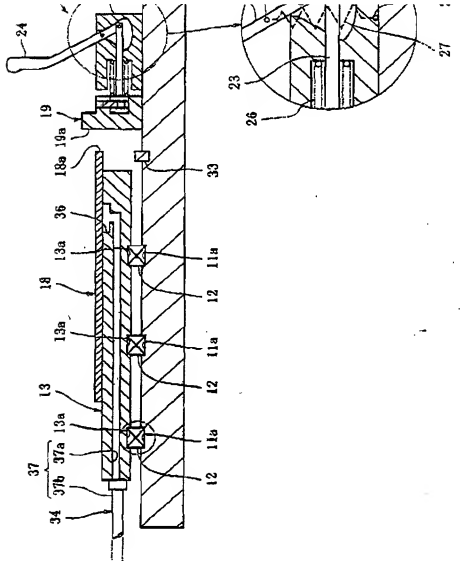
ML6227(5/8)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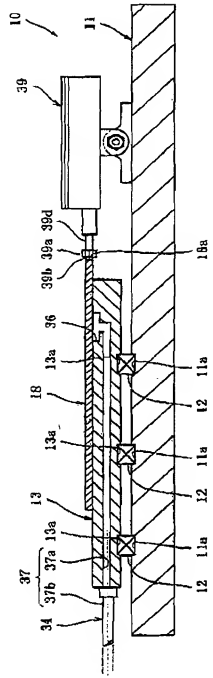
ML6227(6/8)

【図７】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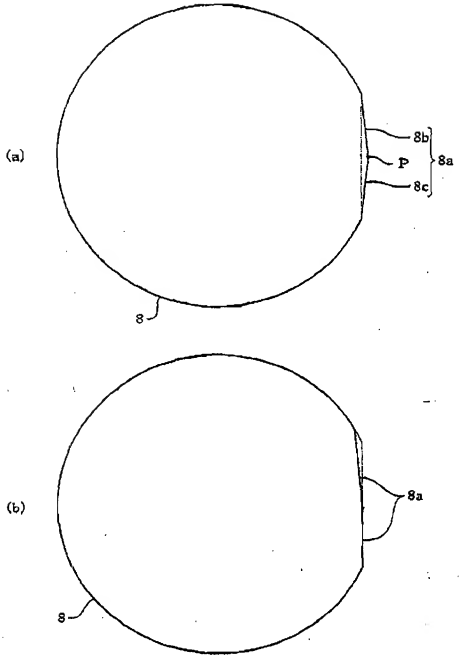
ML6227(7/8)

[図８]



ML6227(8/8)

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EXHIBIT 7

FAX

Date: May 21, 2001

Number of pages including cover sheet: 19

To:
N. Hayashi
K. Gongi

Phone:

Fax phone:

CC:

From:
G. Griffith

Phone:

Fax phone: 503/315-6103

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

[redacted]

(又は 件名と原文)

EXHIBIT 3 (三菱マテリアルシリコン株) 技術情報部 林

Nobuyuki Hayashi

米国三菱シリコンからの
メールとFAX
転送します。

差出人: Griffith, Garry [Garry.Griffith@Mitsubishisilicon.com]
送信日時: 2001年5月22日火曜日 3:00
宛先: Hayashi, Nobuyuki
件名: Revised Linearity Flat Device.

I am faxing the documents to you now. [redacted]. If not let me know and I'll try something else.

I am also sending [redacted]. I will send a copy of that as well.

A note to keep in mind. MSA will be close (Plant Shut-Down) May 27~June 10. All office help (like me) are required to take these days off. The only exceptions will be for a few FAE's on a reduced work schedule.

[redacted]

Regards
Griff

EXHIBIT 7

LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION FLAT

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a measuring apparatus **that provides numerical data relative to** the linearity of an orientation flat (hereinafter referred to as an Ori-Fla).

Description of Related Art

Conventionally, **examination of the linearity of an Ori-Fla portion has been by visual methodology, with no provision of quantitative data in which to make judgements.** On the other hand, there has been disclosed a wafer Ori-Fla positioning method in which an Ori-Fla is positioned by pressing a wafer against a positioning mechanism provided on a wafer chuck mounting surface (Unexamined Japanese Patent Publication No. 10-22368). In this positioning method, the wafer chuck mounting surface is provided so as to be inclined, and a gas flow for floating a wafer with respect to a wafer chuck is generated by air blowing means.

In the positioning method configured as described above, when air is blown from the air blowing means in a state in which a wafer is mounted on the wafer chuck mounting surface, the wafer moves smoothly under gravity toward a positioning mechenism along the inclination of the wafer chuck mounting surface. As a result, the positioning of Ori-Fla can be performed reliably.

Further, there has been disclosed an exposure device that has a stage, a rough positioning mechanism, and number detecting means, and can perform exact rough positioning of a wafer without pattern at the time of first-level pattern exposure (Unexamined Japanese Patent Publication No. 8-78316). In this exposure device, at least three stopper members are provided to roughly position a wafer on the stage, and the stage moves in the longitudinal and transverse X & Y directions and in the rotation direction of θ. Also, the rough positioning mechanism performs rough positioning by causing the peripheral portions of wafer mounted on the stage to abut against the stopper members. Further, the number detecting means detects an identification number scribed on the wafer positioned roughly so that the wafer moves on the stage until the identification number arrives at a predetermined position.

In the conventional method in which the linearity of

Ori-Fla portion is examined visually, however, the acceptability or non-acceptability of linearity cannot be determined quantitatively. Also, in the conventional Ori-Fla positioning method disclosed in the aforementioned Unexamined Japanese Patent Publication No. 10-22368, or in the exposure device disclosed in Unexamined Japanese Patent Publication No. 8-78316, the fabrication accuracy of Ori-Fla, especially the fabrication accuracy in chamfering Ori-Fla is poor because the linearity of the Ori-Fla of **the wafer itself** is not measured. For example, when as shown in FIG. 8(a), a vertex P is formed at the center of an Ori-Fla 8a, and the Ori-Fla 8a is formed of a first side 8b and a second side 8c on opposite sides of the vertex P, there arises a problem in that the crystalline orientation of a wafer 8 deflects comparing the time when the first side 8b is aligned with the positioning mechanism with the time when the second side 8c is aligned with the positioning mechanism. Further, the Ori-Fla 8a of the wafer 8 as shown in FIG. 8(b) also presents the same problem. **With an extremely high level of human expertise, judgements can be made visually if the maximum allowable value of the Ori-Fla linearity is ≥25μm, if the maximum allowable linearity value of the Ori-Fla is <25μm, there arises a problem in that it is nearly impossible to determine the measurement visually.**

SUMMARY OF THE INVENTION

The present invention has been made to solve the above problems **by providing a method of accurately measuring the linearity of the Ori-Fla of a wafer in a short period of time.**

A first mode of the present invention provides a linearity measuring apparatus for a wafer orientation flat, comprising a base in which **one, two, or more** straight tracks are formed in a first direction; a platform which is configured so as to be movable in the first direction by being engaged with the straight track via engagement means, and is further provided with a top surface formed so as to be flat to mount a wafer having an orientation flat; a block which is installed on the base with a predetermined first clearance L being provided with the straight track in a second direction perpendicular to the first direction, and has a flat face against which the orientation flat of the wafer mounted on the platform abuts and which is parallel with the first direction; wafer fixing means provided in the platform to fix the wafer in a state in which the wafer is mounted on the platform; and a **measurement device*** which is installed on the base with a predetermined clearance M being provided with the block in

the first direction, and has a probe opposed to the straight track and capable of being displaced in the second direction, wherein when the clearance between the tip end of the probe and the straight track is taken as N, the following equation is satisfied

$$(N - \alpha) \leq L$$

in which $0 < \alpha \leq 100$ μm.

In order to measure the linearity of an Ori-Fla by using the linearity measuring apparatus for a wafer Ori-Fla in accordance with the first mode of the present invention, the platform on which a wafer is not mounted is first moved in the first direction so as to be opposed to the block. Next, a wafer is mounted on the top surface of the platform, and the wafer is allowed to abut against the flat face of block so that the Ori-Fla is substantially parallel with the flat face. Thereafter, the wafer is fixed on the platform by the wafer fixing means. Next, the platform is moved in the first direction, by which the Ori-Fla is brought into contact range with the probe of the **measuring device, the probe is then lowered to contact the ORI-FLA.** Further, the platform is moved in the first direction, by which the probe of **the measurement device resides on the Ori-Fla, with the probe output signal registering as deflection on the measurement device display. By reading the deflection registered on the measurement device display, the linearity of the Ori-Fla can be provided quantitatively as numerical data.**

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of one embodiment of a linearity measuring apparatus in accordance with the present invention, showing a state before a wafer is mounted on a platform;

FIG. 2 is a plan view corresponding to FIG. 1, showing a state in which a wafer is mounted on a platform and a first Ori-Fla of the wafer is allowed to abut against a block;

FIG. 3 is a plan view corresponding to FIG. 1, showing a state in which a block is separated from an Ori-Fla of wafer;

FIG. 4 is a plan view corresponding to FIG. 1, showing a state in which a platform is moved together with a wafer to **bring the Ori-Fla into range of the measurement device;**

FIG. 5 is a sectional view taken along the line A-A of FIG. 2;

FIG. 6 is a sectional view taken along the line B-B of FIG. 3;

FIG. 7 is a sectional view taken along the line C-C of FIG. 4; and

FIG. 8 is a plan view of a wafer in which the fabrication accuracy of Ori-Fla is poor.
*** A dial indicator is used for illustrative purposes.**

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will now be described with reference to the accompanying drawings.

As shown in FIGS. 1 and 5, three straight tracks 11a such as linear motion guides (LM guides) are formed in a base 11 of a linearity measuring apparatus 10 so as to extend in a first direction, and a platform 13 engages with these straight tracks 11a via engagement means 12. This engagement means 12 has a fixed rail 14 and a movable rail 16 as shown in detail in FIG. 5. The fixed rail 14 is fixed by being inserted in the straight track 11a, and the movable rail 16 is fixed by being inserted in a groove 13a formed in the bottom surface of the platform 13 and is fitted on the fixed rail 14 via needle-shaped rollers 17. The fixed rail 14 is formed with a convex portion 14a that projects upward and extends in the lengthwise direction of the rail 14. The movable rail 16 is formed with a concave portion 16a that has a cross-sectional shape corresponding to the convex portion 14a and a size larger than the convex portion 14a and extends in the lengthwise direction of the rail 16. The needle-shaped roller 17 is configured so as to rotatively slide on the movable rail 16 and rolls on the fixed rail 14. Thereby, the movable rail 16 is configured so as to move in the first direction along the fixed rail 14 or the straight track 11a together with the platform 13. The top surface of the platform 13 is formed so as to be flat so that a wafer 18 is mounted. The wafer 18, having a diameter of 50 to 300 mm, has a first Ori-Fla 18a and a second Ori-Fla 18b. The number of **straight** tracks is not limited to three, and may be one, two, **or more.** Also, the fixed rail may be formed with a concave portion, not the convex portion, and the movable rail may be formed with a convex portion, not the concave portion. Further, between the fixed rail and the movable rail, steel balls or sliding bearings may be interposed instead of the needle-shaped rollers.

On the other hand, a block 19 is provided on the base 11 with a predetermined first clearance L (FIG. 1) being provided with the straight track 11a in a second direction perpendicular to the first direction (FIGS. 1 and 5). This block 19 is installed to the base 11 via release means 21. The block 19 is formed with a flat face 19a that is parallel with the first direction and perpendicular to the top surface of the base 11 so that the first Ori-Fla 18a or the second Ori-Fla 18b of the wafer 18 can abut against the flat face 19a. The first clearance L is a clearance

between the block 19 and the straight track 11a of the three straight tracks 11a which is closest to the block 19. This first clearance L is formed so as to be greater than the distance from the straight track 11a closest to the block 19 to the face of the platform 13 opposed to the block 19. As shown in detail in FIGS. 5 and 6, the release means 21 has a release body 22 installed on the base 11 behind the block 19, a rod 23 one end of which is inserted and fixed in the block 19 and the other end of which is slidably inserted in the release body 22, and an operating lever 24 the substantially central portion of which is swayingly provided on the release body 22 via a first pin 31 and the lower end of which is connected to the other end of the rod 23 via a second pin 32.

A helical compression spring 26 is provided around the rod 23. One end of this spring 26 is pressed on the block 19, and the other end thereof is pressed on the release body 22. Further, a helical tension spring 27 is provided between the release body 22 and the operating lever 24. The lower end of this spring 27 is fixed to a lower pin 28 fixed to the release body 22, and the upper end thereof is fixed to an upper pin 29 fixed to the operating lever 24. The lower pin 28 is located on the vertical line passing through the first pin 31, and the upper pin 29 is located at an upper position separated a predetermined distance from the first pin 31 in the lengthwise direction of the operating lever 24. The operating lever 24 is configured so as to be swayed between a first position (FIG. 5) at which the first Ori-Fla 18a or the second Ori-Fla 18b is allowed to abut against the flat face 19a of the block 19 and thereby the wafer 18 can be positioned and a second position (FIG. 6) at which the block 19 is separated from the first Ori-Fla 18a or the second Ori-Fla 18b, that is, the block 19 goes apart from the straight track 11a.

The spring constant of the helical tension spring 27 is set so as to be larger than that of the helical compression spring 26. Therefore, when the operating lever 24 is operated to the second position, the elastic force of the helical tension spring 27 overcomes that of the helical compression spring 26, so that the helical tension spring 27 can temporarily be held at the second position. Reference numeral 33 in FIGS. 5 and 6 denotes a flat bar fixed to the base 11 in parallel with the straight track 11a. This flat bar 33 has a function such that when the operating lever 24 is operated to the first position (FIG. 5), the flat face 19a of the block 19 abuts against the flat bar 33, by which the flat face 19a of the block 19 is corrected so as to become parallel with the straight track 11a. Also, reference numeral 24a denotes an elongated hole formed in a lower end portion of the operating lever 24 so that the second pin 32 is inserted in this elongated hole

24a.

On the other hand, the platform 13 is provided with wafer fixing means 34 for fixing the wafer 18 in a state in which the wafer 18 is mounted on the platform 13 (FIGS. 1 and 5). This wafer fixing means 34 includes a suction port 36 for attracting and fixing the wafer 18, which is formed in the top surface of the platform 13, a suction hole 37a one end of which communicates with the suction port 36, which is formed in the platform 13, a suction pipe 37b one end of which is connected to the other end of the suction hole 37a and the other end of which is connected to a vacuum **supply** (not shown), a switching valve (not shown) for switching the suction port 36 to a negative pressure or the atmospheric pressure, which is provided in the suction pipe 37b, and a selector switch 38 for turning on/off the switching valve. The suction hole 37a and the suction pipe 37b constitute a suction passage 37. The switching valve, which is an electromagnetic valve for 3-port 2-position switching, is configured so that when the selector switch 38 is turned on, the suction port 36 communicates with the vacuum **supply** to provide a negative pressure, and when the selector switch 38 is turned off, the suction port 36 communicates with the atmosphere to provide the atmospheric pressure. Also, a **measurement device** 39 having a probe 39a at the tip end of a spindle 39d is installed on the base 11 (FIGS. 1 to 4 and 7). This **measurement device** 39 is located on the base 11 with a predetermined second clearance M (FIG. 1) being provided with the block 19 in the first direction, and is configured so that the probe 39a can be displaced in the second direction in such a manner as to be opposed to the straight track 11a. At the tip end of the probe 39a, there is provided a (**e.g.**) steel ball 39b capable of rolling on the first Ori-Fla 18a or the second Ori-Fla 18b. Taking a clearance between the tip end of the probe 39a and the straight track 11a as N, the dial gauge 39 is fixed on the base 11 so that the following equation (1) is satisfied.

$$(N - \alpha) \leq L \quad \ldots (1)$$

In Eq. (1), $0 < \alpha \leq 100$ μm, preferably $40 < \alpha \leq 60$ μm.

A method for using an apparatus 10 for measuring the linearity of the first Ori-Fla 18a of the wafer 18, which is constructed as described above, will be described with reference to FIGS. 1 to 7.

First, the selector switch 38 is turned off, and the platform 13 on which the wafer is not mounted is moved in the first direction so that the platform 13 is opposed to the block 19. Then, the operating lever 14 is operated to the first position (FIG. 5) to cause the flat face 19a of the block 19 to abut against the flat bar 33 (FIG. 1). Next, a wafer 18 is mounted on the top surface of the

platform 13, and the first Ori-Fla 18a of the wafer 18 is caused to abut against the flat face 19a of the block 19 in such a manner as to be parallel with the flat face 19a (FIGS. 2 and 5). In this state, the selector switch 38 is turned on to cause the suction port 36 to communicate with the vacuum **supply**, by which the wafer 18 is attracted and fixed onto the platform 13. Next, the operating lever 24 is turned from the first position (FIG. 5) to the second position (FIG. 6) to move the block 19 in the second direction so as to be separated from the wafer 18 (FIGS. 3 and 6). In this state, the platform 13 on which the wafer 18 is mounted and fixed is moved in the first direction, by which the first Ori-Fla 18a is brought into contact under **range** with the tip end of the probe 39a of the **measurement device** 39 (FIGS. 4 and 7). When the platform 13 is further moved in the first direction, the steel ball 39b at the tip end of the probe 39a of the **measurement device** 39 rolls on the first Ori-Fla 18a, and the **display** 39c of the **measurement device** 39 deflects. The deflection shown on the **display** 39c of the **measurement device** 39 when the steel ball 39b at the tip end of the probe 39a of the **measurement device** 39 rolls from one end of the first Ori-Fla 18a to the other end thereof is read. The acceptability or non-acceptability of linearity of the first Ori-Fla 18a of the wafer 18 can be judged according to whether or not the deflection is within, for example, 25 μm. When the linearity of the first Ori-Fla 18a of another wafer 18 is measured succeedingly, the selector switch 38 is turned off, and the wafer 18 having been **just** subjected to measurement is removed from the platform 13. Thereafter, the above-described procedure is repeated. In this manner, the linearity of the first Ori-Fla 18a of the wafer 18 can be measured accurately in a short period of time.

Although the linearity of the first Ori-Fla is measured by using the linearity measuring apparatus in the above-described embodiment, the linearity of the second Ori-Fla may **also** be measured **by the same sequential method.**

Furthermore, in the above-described embodiment, **the deflection registered on the measurement device display** is read visually. However, if the linearity measuring apparatus is configured so that the deflection data of the **measurement device display** can be outputted as an **electronic** signal, the Ori-Fla linearity data for each wafer can be stored by connecting the **electronic** signal to the input of a computer, and also the acceptability or non-acceptability of **the** linearity of **the** Ori-Fla can be **analyzed/determined** by means of the computer when the apparatus of the present invention is automated.

The present invention achieves the following effects: as described above, according to the present invention, the platform is moved in the first direction so as to be

EXHIBIT 7

opposed to the block, a wafer is fixed on the platform so that the Ori-Fla abuts against the block, **the block is retracted**, and the platform is moved in the first direction so that the Ori-Fla is brought into **measurement range** with the probe of the **measurement device**, **and the probe is lowered until contact with the ORI-FLA is made.** Therefore, by reading the deflection **displayed on the measurement device** when the **ORI-FLA is moved** from one end to the other end thereof, the linearity of Ori-Fla can be displayed quantitatively as numerical data so that the acceptability or non-acceptability of linearity of the Ori-Fla of the wafer can be **determined.** As a result, the linearity of the Ori-Fla of the wafer can be measured accurately in a short period of time.

Also, if the wafer fixing means has the suction port for attracting and fixing the wafer, the suction passage communicating with the suction port, and the switching valve for switching the suction port to a negative pressure or the atmospheric pressure, the wafer can be fixed on the platform by a very simple operation without damage to the wafer.

Also, if the release means for moving the block in the second direction in which the block **retracts** from the straight track is provided, the Ori-Fla moves in a state of being separated from the block when the platform with the wafer being mounted thereon is moved in the first direction. As a result, the wafer is not damaged.

Further, if the linearity measuring apparatus is configured so that the deflection data of the **measurement device display** can be outputted as an **electronic** signal, the Ori-Fla linearity data for each wafer can be stored by connecting the **electronic** signal to the input of a computer, and also the acceptability or non-acceptability of linearity of Ori-Fla can be **analyzed/determined** by means of the computer when the apparatus of the present invention is automated.

WHAT IS CLAIMED IS:

1. A linearity measuring apparatus for a wafer orientation flat, comprising:

a base in which **one, two, or more** straight tracks are formed in a first direction;

a platform which is configured so as to be movable in said first direction by being engaged with said straight track via engagement means, and is further provided with a top surface formed so as to be flat to mount a wafer having an orientation flat;

a block which is installed on said base with a predetermined first clearance L being provided with the straight track in a second direction perpendicular to said first direction, and has a flat face against which the

orientation flat of said wafer mounted on said platform abuts and which is parallel with said first direction;

wafer fixing means provided in said platform to fix said wafer in a state in which said wafer is mounted on said platform; and

a **measurement device** which is installed on said base with a predetermined clearance M being provided with said block in said first direction, and has a probe opposed to said straight track and capable of being displaced in said second direction, wherein

when a clearance between the tip end of said probe and said straight track is taken as N, the following equation is satisfied

$$(N - \alpha) \leq L$$

in which $0 < \alpha \leq 100$ μm.

2. The linearity measuring apparatus according to claim 1, wherein said wafer fixing means has a suction port formed in said platform to attract and fix said wafer, a suction passage communicating with said suction port, and a switching valve provided in said suction passage to switch said suction port to a negative pressure or the atmospheric pressure.

3. The linearity measuring apparatus according to claim 1, wherein release means for moving said block in said second direction in which said block goes apart from said straight track is provided.

4. The linearity measuring apparatus according to claim 1, wherein deflection data **displayed on the measurement device** can be outputted as an electrical signal.

5. The linearity measuring apparatus according to claim 1, wherein said apparatus can be applied to a wafer having a diameter in the range of 50 to 300 mm.

ABSTRACT OF THE DISCLOSURE

Straight tracks 11a are formed in a first direction on a base 11. The top surface of a platform 13 is formed so as to be flat to mount a wafer 18 having an Ori-Fla 18a, and the platform is moved in the first direction by being engaged with the straight tracks via engagement means 12. A block 19 having a flat face 19a against which the Ori-Fla of the wafer abuts and which is parallel with the first direction is installed with a first clearance L being provided with the straight track in a second direction perpendicular to the first direction. Wafer fixing means 34 for fixing the wafer in a state in which the wafer is mounted on the platform is provided in the platform, and a **measurement device** 39 having a probe 39a opposed to the straight track and capable of being displaced in the second direction is installed with a second clearance M being

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provided with the block in the first direction. When a clearance between the tip end of the probe and the straight track is taken as N, the relationship of $(N - \alpha) \leq L$ exists, in which $0 < \alpha \leq 100$ μm. By this configuration, the linearity of the Ori-Fla can be measured accurately in a short period of time.

FIG. 1

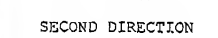


FIG. 2

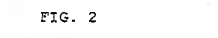


FIG. 3

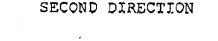
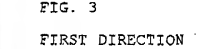


FIG. 4



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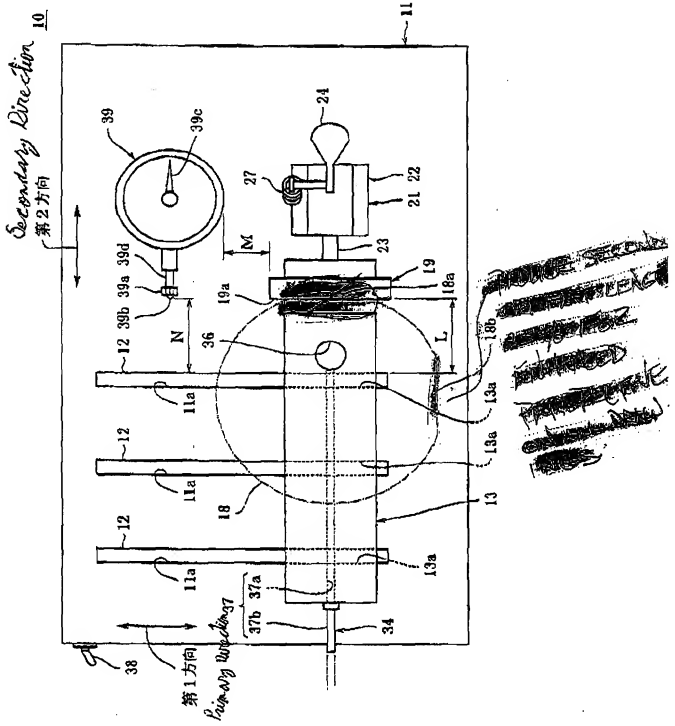
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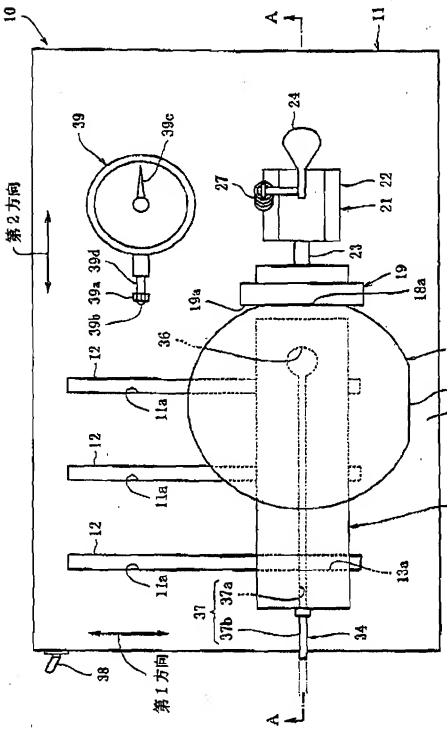
第１方向
Primary Direction

【図２】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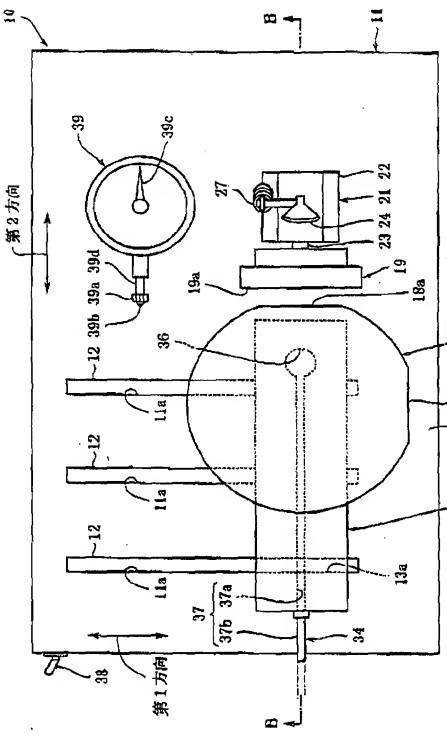
【図３】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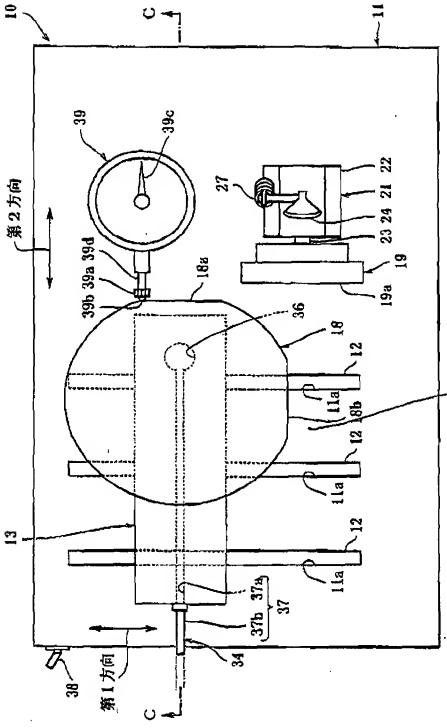
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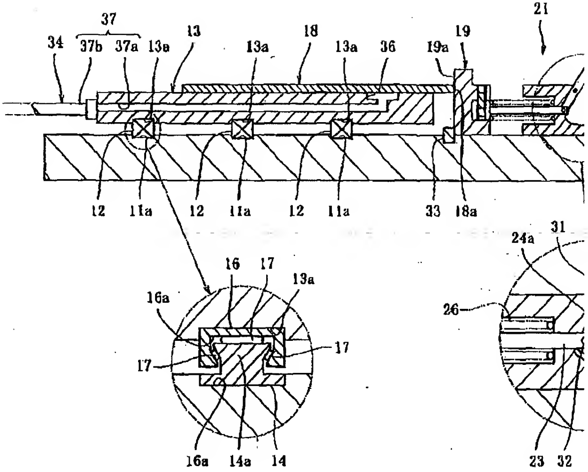
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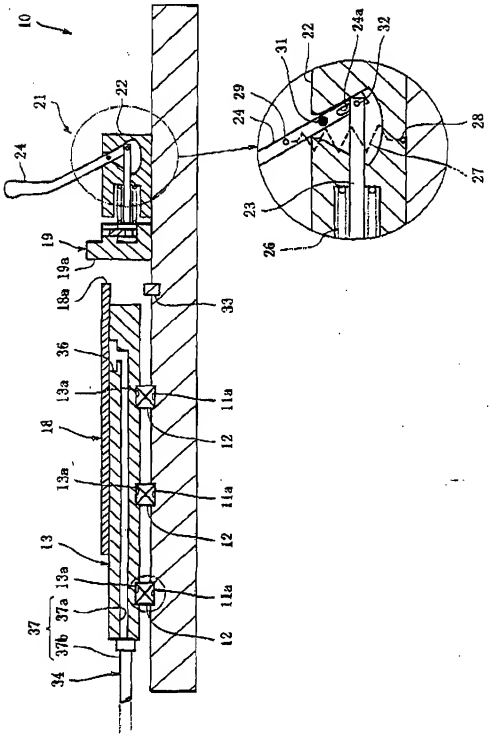
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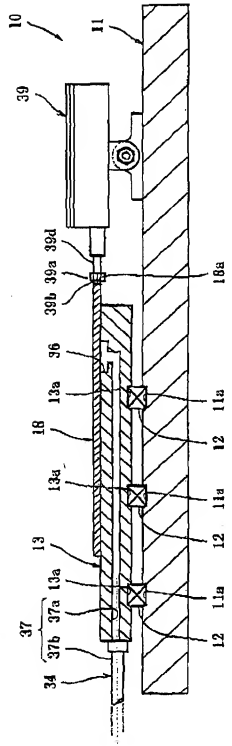
【図7】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【図８】

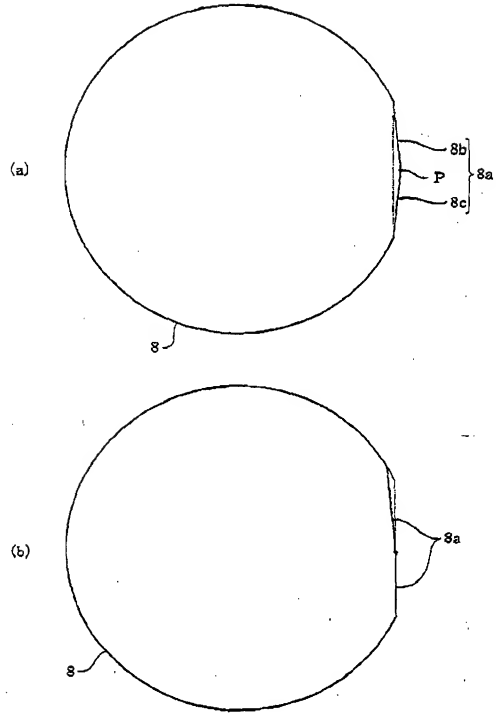

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EXHIBIT 7

METHOD FOR SUPPLYING RESIDUAL PAINT IN PAINT HOSE AT A CONSTANT RATE

Patent Number: JP1022368

Publication date: 1989-01-25

Inventor(s): WATANABE KANEMITSU; others: 02

Applicant(s):: NISSAN MOTOR CO LTD

Requested Patent: JP1022368

Application Number: JP19870175877 19870716

Priority Number(s):

IPC Classification: B05B7/02 ; B05B7/24

EC Classification:

Equivalents: JP2103513C, JP8024858B

Abstract

PURPOSE:To maintain the pressure in a paint hose constant by sending the signal from a pressure sensor for detecting the pressure in the hose provided to the paint hose to a control means and sending the signal from the control means to a pressure control valve provided to a pneumatic flow passage.
CONSTITUTION:The paints from paint sources 8, 9 are discharged from a spray gun 11 through the paint hose 12 connected to a color change valve 1. A discharge rate changes when the residual paint is pressurized by a specified air pressure if the amt. of the residual paint changes according to the discharging of the paint from the spray gun 11 in the case of utilizing the paint remaining between the color change valve 1 and the spray gun 11. The pressure in the paint hose is, therefore, detected by the pressure sensor 30 and the air pressure in the pneumatic flow passage 29 is so changed as to keep the pressure constant. The residual paint is thereby effectively utilized.

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Click on any of the Patent Numbers below to see the details of the patent

Basket	Patent Number	Title
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To refine your search, click on the icon in the menu bar
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Basket	Patent Number	Title

To refine your search, click on the icon in the menu bar
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CALCULATION SHEET / NEW PATENT APPLICATION

EXHIBIT 7

Inventor(s) How many? 2 Docket # SU-5072

Assignment (Y) / N 2 Assignees

Small Entity Y / N DUE DATE ASAP

15 pages of Specification

2 pages of Claims 5/1 # of Claims Y / (N) Multiple dependency (MD)

1 Abstract

8 sheet(s) of Drawings (Figure(s) 1-8) pgs 5-4

_____ DECLARATION ____ unsigned ____ executed ____ to follow

_____ Based on _____ Application No(s): _____

Filed : _____

_____ **Other**(list them)

		LARGE	SMALL	LARGE $ 710.00	SMALL $ 355.00
TOTAL Claims / over 20:		x $ 18.00	x $ 9.00		
Independent Claims / over 3:		x $ 80.00	x $ 40.00		
Multiple Dependent Claims		+ $ 270.00	+ $ 135.00		
Surcharge (Declaration)		+ $ 130.00	+ $ 65.00		
Assignment		+ $ 40.00			
Surcharge (Translation)		+ $ 130.00			
			TOTAL:		

CLAIMS==========

NUMBER OF CLAIMS w\DEPENDENCY as filed

on reverse side

NUMBER OF CLAIMS and DEPENDENCY as filed

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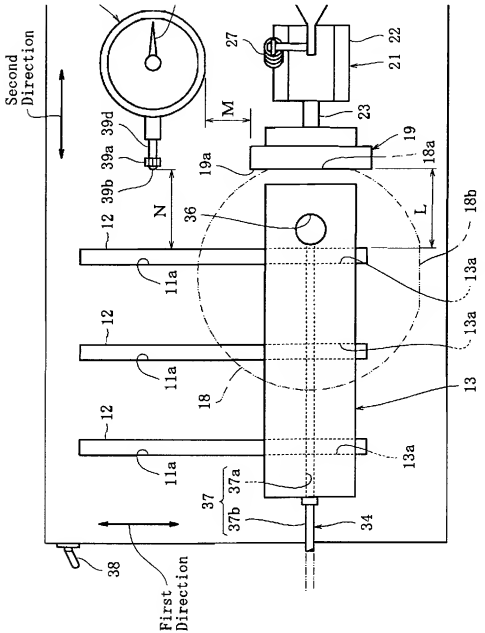
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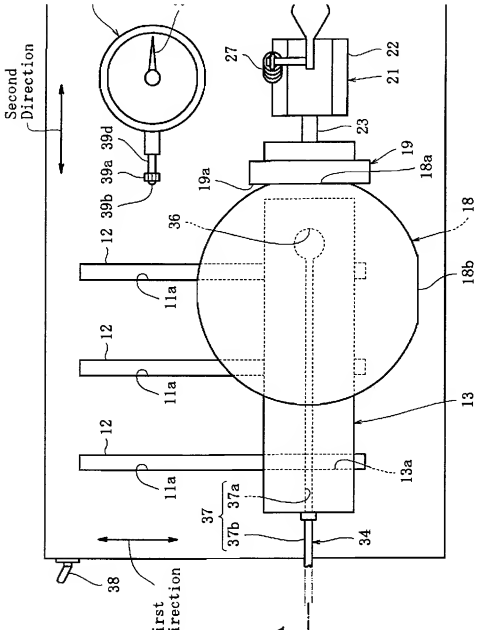
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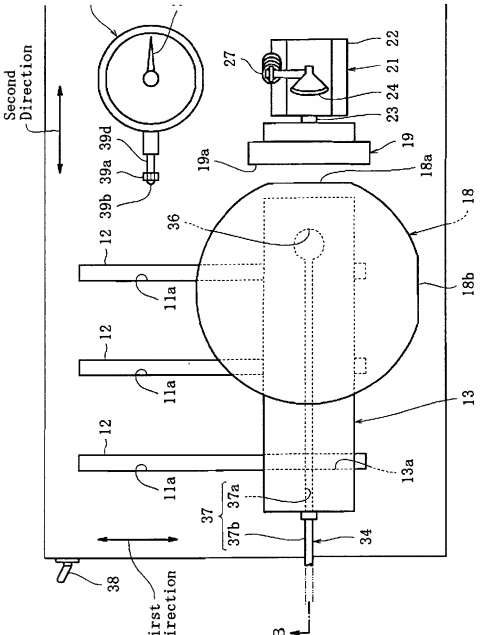
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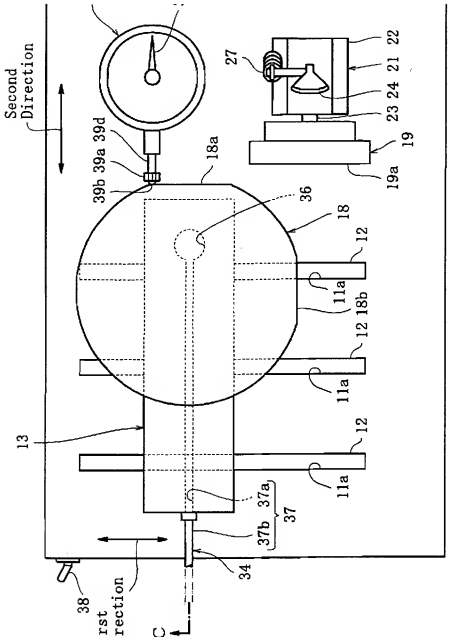
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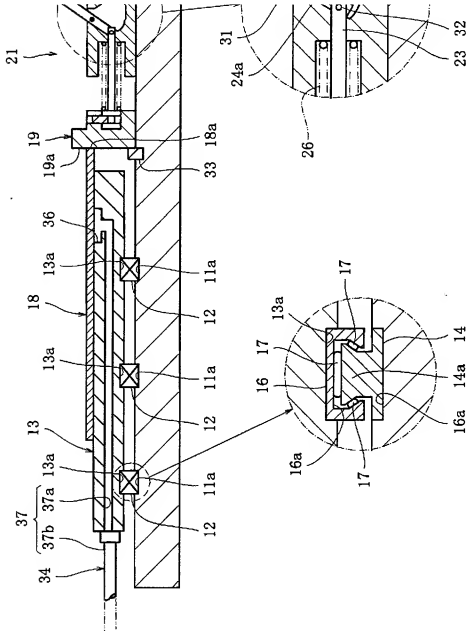
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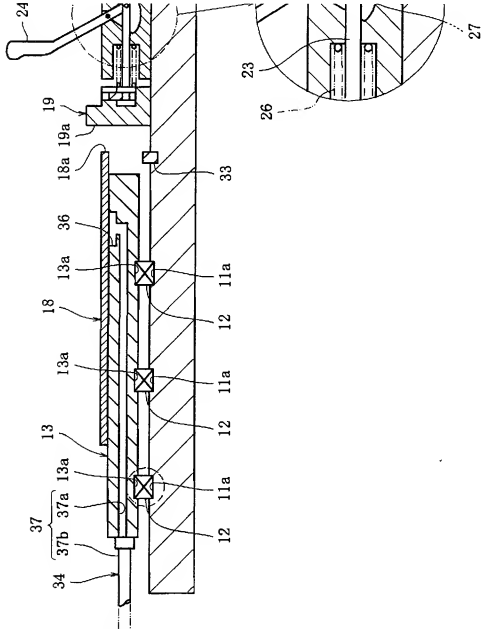
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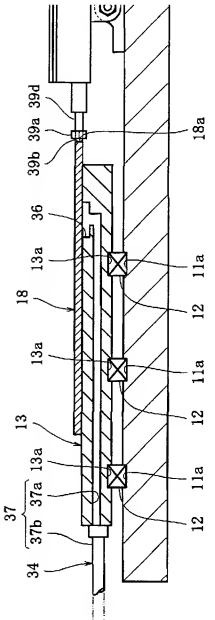
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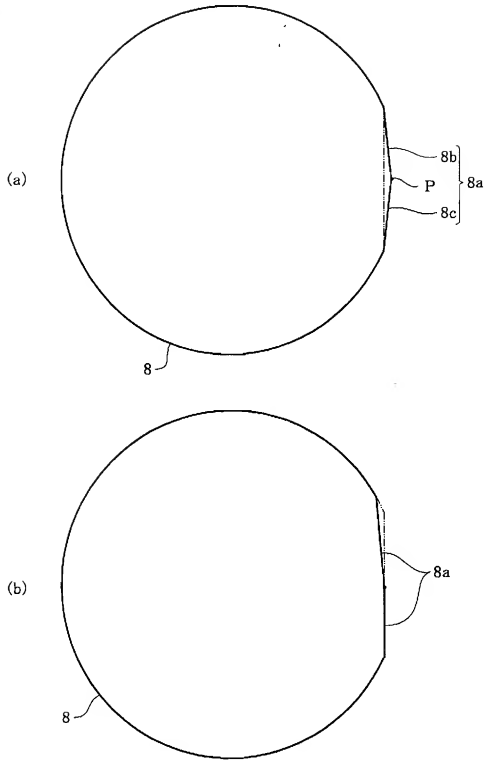
Boll

Fig. 8



Right

September 20, 2002

Your ref.: ML6227US
Our ref.: JG-SU-5072 / 600577.20035

Via Facsimile 011 813 3986 4443
Confirmation by Air Mail

Sude Patent Office
Nissei Higashi-Ikebukuro Bldg.
11-1 Nissei Higashi-Ikebukuro 1-Chome
Toshima-ku, Tokyo 170-0013, JAPAN

Re: U. S. Patent Appln. Ser. No. 09/904,425
In the names of Cindy KOHANEK and Gary BABB
Entitled: LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION FLAT
Assignees: Mitsubishi Materials Silicon Corporation and Mitsubishi Silicon America Corporation

Dear Mr. Sude:

Thank you for your facsimile of September 12, 2002. I apologize for not having been able to get to this earlier.

I have reviewed your letter [redacted]

[redacted]

599 Lexington Avenue
New York, NY 10022-7650
212.521.5400
Fax 212.521.5450

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TRANSMISSION REPORT

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NOTE:
No. : OPERATION NUMBER 48 : 4800BPS SELECTED EC : ERROR CORRECT G2 : G2 COMMUNICATION
PD : POLLED BY REMOTE SF : STORE & FORWARD RI : RELAY INITIATE RS : RELAY STATION
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Jules E. Goldberg • 212.521.5403 • jgoldberg@reedsmith.com

September 20, 2002

Your ref.: ML6227US
Our ref.:JG-SU-5072 / 500577.20035

Via Facsimile 011 813 3986 4443
Confirmation by Air Mail

Suda Patent Office
Nissei Higashi-Ikebukuro Bldg.
11-1 Nissei Higashi-Ikebukuro 1-Chome
Toshima-ku, Tokyo 170-0013, JAPAN

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Assignees: Mitsubishi Materials Silicon Corporation and Mitsubishi Silicon America Corporation

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I have reviewed your letter [redacted]

[redacted]

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212.521.5400
Fax 212.521.5450

Delaware
New Jersey
New York
Pennsylvania
United Kingdom
Virginia
Washington, DC

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ReedSmith

[redacted]

Kind regards.

Very truly yours,

Jules Goldberg /cf

JEG:dej

Jules E. Goldberg

EXHIBIT 7

SUDA PATENT OFFICE

MEMBER OF A·I·P·P·I

MASAYOSHI SUDA PATENT ATTORNEY
NISSEI HIGASHI-IKEBUKURO BLDG.
11-1 HIGASHI-IKEBUKURO 1-CHOME
TOSHIMA-KU, TOKYO 170-0013, JAPAN

TELEPHONE: 03-3988-4326
FACSIMILE: 03-3986-4443

September 20, 2002
FACSIMILE TRANSMISSION
CONFIRMATION BY AIRMAIL

REED SMITH LLP
599 LEXINGTON AVENUE
29th FLOOR
NEW YORK, N.Y 10022-7650
U.S.A.

Attention: Jules E. Goldberg, Esquire

Your Ref: JG-SU-5072/500577.20035 Our Ref: ML6227US

Re: U.S. Patent Application Serial No. 09/904,425
Assignees: MITSUBISHI MATERIALS SILICON CORPORATION
MITSUBISI SILICON AMERICA CORPORATION

Dear Mr. Goldberg:

Further to our letter of September 12, 2002 and our reminder of September 19, 2002, w[redacted]

Please acknowledge this letter by return facsimile.

Very truly yours,

SUDA PATENT OFFICE

Masayoshi Suda

Masayoshi Suda

MS/my

R004

EXHIBIT 7

5 sheets in all

SUDA PATENT OFFICE

MEMBER OF A.I.P.P.I

MASAYOSHI SUDA PATENT ATTORNEY
NISSEI HIGASHI-IKEBUKURO BLDG.
11-1 HIGASHI-IKEBUKURO 1-CHOME
TOSHIMA-KU, TOKYO 170-0013, JAPAN

TELEPHONE: 03-3986-4326
FACSIMILE: 03-3986-4443

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September 12, 2002
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REMINDER

REED SMITH LLP
599 LEXINGTON AVENUE
29th FLOOR
NEW YORK, N.Y 10022-7650
U.S.A.

Attention: Jules E. Goldberg, Esquire

Your Ref: JG-SU-5072/500577.20035 Our Ref: ML6227US

Re: U.S. Patent Application Serial No. 09/904,425
Assignees: MITSUBISHI MATERIALS SILICON CORPORATION
MITSUBISI SILICON AMERICA CORPORATION

Dear Mr. Goldberg:

Thank you for your letter of July 31, 2002 together with an Office Action concerning the above-identified application.

In advance of responding to the Patent Office Action, [redacted]

[redacted] Your comment on the above would be appreciated by September 16, 2002.

R005

SUDA PATENT OFFICE **EXHIBIT 7**

Please acknowledge receipt of this letter by return facsimile.

Very truly yours,

SUDA PATENT OFFICE

Masayoshi Suda

MS/my

[redacted]

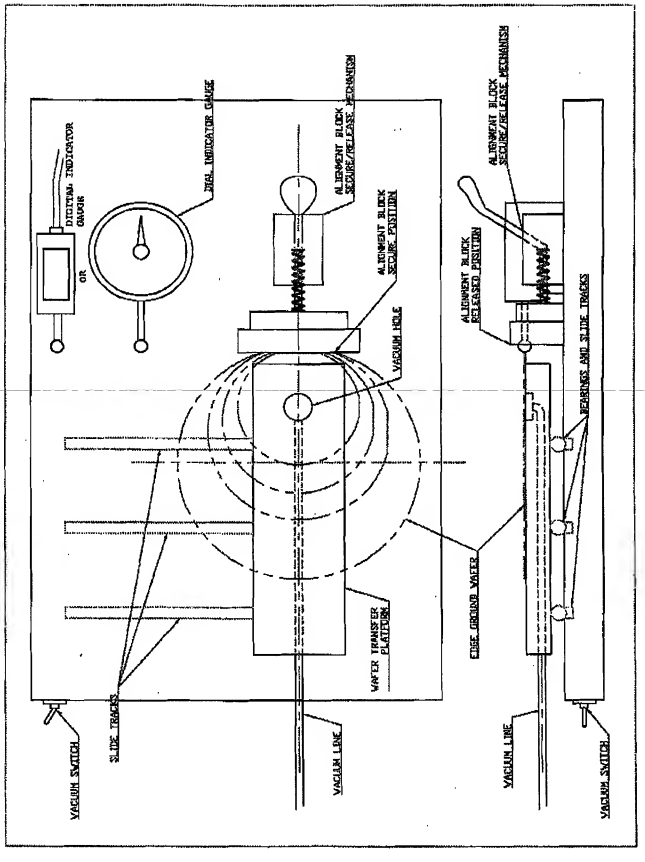
Our Ref: ML6227US

[redacted]

Our Ref: ML6227US
[redacted]

[redacted]

EXHIBIT 7



R009

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Jules E. Goldberg · 212.521.5400 · jgoldberg@reedsmith.com

July 31, 2002

Your ref.: ML6227US
Our ref.: JG-SU-5072 / 500577.20036

Suda Patent Office
Shinseiwa Ikebukuro Bldg.
24-3 Higashi-Ikebukuro 1-Chome
Toshima-ku, Tokyo 170, JAPAN

Re: U.S. Patent Appln. Ser. No. 09/904,425
In the names of Cindy KOHANEK and Gary BABB
Entitled: LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION FLAT
Assignees: Mitsubishi Materials Silicon Corporation and Mitsubishi Silicon America Corporation

Dear Mr. Suda:

Enclosed herewith is an Office Action which must be responded to by the following dates (extensions of time for the response can be obtained by payment of the indicated fees):

Statutory Period	Date	Fee
3-month	October 3, 2002	No fee
4-month	November 3, 2002	$110.00
5-month	December 3, 2002	$400.00
6-month	January 3, 2003	$920.00 - cannot be further extended

[redacted]

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TRANSMISSION REPORT

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No.	REMOTE STATION	START TIME	DURATION	#PAGES	MODE	RESULTS
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TOTAL 0:02'27" 9

NOTE:
No. : OPERATION NUMBER 48 : 4800BPS SELECTED EC : ERROR CORRECT G2 : G2 COMMUNICATION
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MB : SEND TO MAILBOX PG : POLLING A REMOTE MP : MULTI-POLLING RM : RECEIVE TO MEMORY

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Jules E. Goldberg • 212.521.5403 • jgoldberg@reedsmith.com

July 31, 2002

Your ref.: ML6227US
Our ref.:JG-SU-5072 / 500577.20035

Suda Patent Office
Nissei Higashi-Ikebukuro Bldg.
Nissei Higashi-Ikebukuro 1-Chome
Toshima-ku, Tokyo 170-0013, JAPAN

Re: U. S. Patent Appln. Ser. No. 09/904,425
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Assignees: Mitsubishi Materials Silicon Corporation and Mitsubishi Silicon America Corporation

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4-month	November 3, 2002	$110.00
5-month	December 3, 2002	$400.00
6-month	January 3, 2003	$920.00 - **cannot be further extended**

[redacted]

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New York, NY 10022-7650
212.521.5400
Fax 212.521.5450

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Washington, DC

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ReedSmith

I am also pleased to enclose herewith the assignment which was recorded in the Patent Office on **March 11, 2002** under **Reel 012730, Frame 0063** (Bar code 102040965A).

Kind regards.

Very truly yours,

JEG:dej

Jules E. Goldberg

Enc: [redacted]

EXHIBIT 7

ReedSmith

Jules E. Goldberg • 212.521.5403 • jgoldberg@reedsmith.com

April 22, 2002

Your ref.: ML6227US
Our ref.:JG-SU-5072 / 500577.20035

Suda Patent Office
Shinseiwa Ikebukuro Bldg.
24-3 Higashi-Ikebukuro 1-Chome
Toshima-ku, Tokyo 170, JAPAN

Re: U. S. Patent Appln. Ser. No. 09/904,425
In the names of Cindy KOHANEK and Gary BABB
Entitled: LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION FLAT
Assignees: Mitsubishi Materials Silicon Corporation and Mitsubishi Silicon America Corporation

Dear Mr. Suda:

Thank you for your letter of February 7, 2002 enclosing [redacted]. A copy of our submission is enclosed.

We shall keep you apprised of further developments in due course. Our invoice is enclosed.

Very truly yours,

Jules E. Goldberg

JEG:dej

Enclosures: [redacted]
Invoice

375 Park Avenue
17th Floor
New York, NY 10152-1799
212.521.5400
Fax 212.521.5450

Delaware
New Jersey
New York
Pennsylvania
Virginia
Washington, DC

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SUDA PATENT OFFICE

MEMBER OF A·I·P·P·I

MASAYOSHI SUDA PATENT ATTORNEY
NISSEI HIGASHI-IKEBUKURO BLDG.
11-1 HIGASHI-IKEBUKURO 1-CHOME
TOSHIMA-KU, TOKYO 170-0013, JAPAN

TELEPHONE: 03-3988-4326
FACSIMILE: 03-3986-4443

February 7, 2002
BY FEDERAL EXPRESS

REED SMITH LLP
375 PARK AVENUE,
NEW YORK, N.Y 10152-1799.
U.S.A.

Attention: Jules E. Goldberg, Esquire

Your Ref: JG-SU-5072/500577.20035 Our Ref: ML6227US

Re: U.S. Patent Application Serial No. 09/904,425
Assignees: MITSUBISHI MATERIALS SILICON CORPORATION
MITSUBISI SILICON AMERICA CORPORATION

Dear Mr. Goldberg:

Thank you for your letter January 23, 2002 enclosed with [redacted]

[redacted]

Please acknowledge a safety receipt of this letter by return facsimile.

Very truly yours,

SUDA PATENT OFFICE

Masayoshi Suda

Masayoshi Suda

MS/my

Encl.: As stated above

Roll

EXHIBIT 7

ReedSmith LLP

Jules E. Goldberg • 212.521.5403 • jgoldberg@reedsmith.com

Suda Patent Office
Shinseiwa Ikebukuro Bldg.
24-3 Higashi-Ikebukuro 1-Chome
Toshima-ku, Tokyo 170, JAPAN

January 23, 2002

Re: New U. S. Patent Application in the names of Cindy KOHANEK and Gary BABB
Priority: Japanese Patent Appln No. 2001-183702 filed June 18 2001
Entitled: LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION FLAT
Assignees: Mitsubishi Materials Silicon Corporation and
Mitsubishi Silicon America Corporation
Your ref.: ML6227US
Our ref.: JG-SU-5072 / 500577.20035

Dear Mr. Yanagawa:

Further to our letter of July 12, 2001, we have now received [redacted]

Please note the following particulars for the present application:
Serial No.: 09/904,425 Filing Date: July 12, 2001

[redacted]

Very truly yours,

Jules E. Goldberg /ram

Jules E. Goldberg

JEG:ram
Enclosure(s)
[redacted]

375 Park Avenue
17th Floor
New York, NY 10152-1799
212.521.5400
Fax 212.521.5450

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Jules E. Goldberg • 212.521.5403 • jgoldberg@reedsmith.com

Suda Patent Office
Shinseiwa Ikebukuro Bldg
24-3 Higashi-Ikebukuro 1-Chome
Toshima-ku, Tokyo 170, JAPAN

January 23, 2002

Re: New U. S. Patent Application in the names of Cindy KOHANEK and Gary BABB
Priority: Japanese Patent Appln No. 2001-183702 filed June 18 2001
Entitled: LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION FLAT
Assignees: Mitsubishi Materials Silicon Corporation and
Mitsubishi Silicon America Corporation
Your ref.: ML6227US
Our ref.: JG-SU-5072 / 500577.20035

Dear Mr. Yanagawa:

Further to our letter of July 12, 2001, we have now received [redacted]

Please note the following particulars for the present application:
Serial No.: 09/904,425 Filing Date: July 12, 2001

[redacted]

Very truly yours,

Rolf

EXHIBIT 7

SUDA PATENT OFFICE

MEMBER OF A・I・P・P・I

MASAYOSHI SUDA PATENT ATTORNEY
NISSEI HIGASHI-IKEBUKURO BLDG.
11-1 HIGASHI-IKEBUKURO 1-CHOME
TOSHIMA-KU, TOKYO 170-0013, JAPAN

TELEPHONE: 03-3988-4326
FACSIMILE: 03-3986-4443

July27, 2001
BY FEDERAL EXPRESS

REED SMITH LLP
375 PARK AVENUE,
NEW YORK, N.Y 10152-1799.
U.S.A.

Attention: Jules E. Goldberg, Esquire

Your Ref: JG-SU-5072/500577.20035 Our Ref: ML6227US

Re : New U.S. Patent Application corr. to the Japanese Patent Application No.2001-183702 filed on Juln 18, 2001
Assignees: MITSUBISHI MATERIALS SILICON CORPORATION
MITSUBISI SILICON AMERICA CORPORATION

Dear Mr. Goldberg:

Thank you for your letter of July 12, 2001 with respect to the above-identified application.

[redacted]

Please acknowledge a safety receipt of this letter by return facsimile.

Very truly yours,

SUDA PATENT OFFICE

Masayoshi Suda

MS/my

Encl.: [redacted]

R017

EXHIBIT 7

****
*** TX REPORT ***
****

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TX/RX NO	1586
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CONNECTION ID	
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USAGE T	00'39
PGS.	1
RESULT	OK

SUDA PATENT OFFICE

MEMBER OF A·I·P·P·I

MASAYOSHI SUDA PATENT ATTORNEY

NISSEI HIGASHI-IKEBUKURO BLDG.
11-1 HIGASHI-IKEBUKURO 1-CHOME
TOSHIMA-KU, TOKYO 170-0013, JAPAN

TELEPHONE: 03-3986-4326
FACSIMILE: 03-3986-4443

July27, 2001
BY FEDERAL EXPRESS

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375 PARK AVENUE,
NEW YORK, N.Y 10152-1799.
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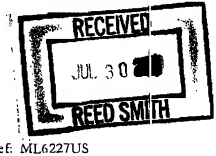

Attention: Jules E. Goldberg, Esquire

Your Ref: JG-SU-5072/500577.20035 Our Ref: ML6227US

Re : New U.S. Patent Application corr. to the Japanese Patent Application No.2001-183702 filed on Juln 18, 2001
Assignees: MITSUBISHI MATERIALS SILICON CORPORATION
MITSUBISI SILICON AMERICA CORPORATION

Dear Mr. Goldberg:

Thank you for your letter of July 12, 2001 with respect to the above-identified application.

[redacted]

Please acknowledge a safety receipt of this letter by return facsimile.

Very truly yours,

Rolß

EXHIBIT 7

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*** TX REPORT ***
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TX/RX NO	1347
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CONNECTION ID	
ST. TIME	07/12 16:22
USAGE T	00'56
PGS.	2
RESULT	OK

ReedSmith

Jules E. Goldberg • 212.521.5403 • jgoldberg@reedsmith.com

Suda Patent Office
Shinseiwa Ikebukuro Bldg.
24-3 Higashi-Ikebukuro 1-Chome
Toshima-ku, Tokyo 170, JAPAN

July 12, 2001

Re: New U. S. Patent Application in the names of Cindy KOHANEK and Gary BABB
Priority: Japanese Patent Appln No. 2001-183702 filed June 18 2001
Entitled: LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION F LAT
Assignees: Mitsubishi Materials Silicon Corporation and
Mitsubishi Silicon America Corporation
Your ref.: ML6227US
Our ref.: JG-SU-5072 / 500577.20032 5

Dear Mr. Suda:

Thank you for your order letter of July 4, 2001 with enclosures, the above-identified application was timely filed in the U. S. Patent and Trademark Office today (July 12, 2001) without an executed declaration.

[redacted]

R019

EXHIBIT 7

ReedSmith LLP

Jules E. Goldberg • 212.521.5403 • jgoldberg@reedsmith.com

Suda Patent Office
Shinseiwa Ikebukuro Bldg.
24-3 Higashi-Ikebukuro 1-Chome
Toshima-ku, Tokyo 170, JAPAN

July 12, 2001

Re: New U. S. Patent Application in the names of Cindy KOHANEK and Gary BABB
Priority: Japanese Patent Appln No. 2001-183702 filed June 18 2001
Entitled: LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION FLAT
Assignees: Mitsubishi Materials Silicon Corporation and
Mitsubishi Silicon America Corporation
Your ref.: ML6227US
Our ref.: JG-SU-5072 / 500577.20035

Dear Mr. Suda:

Thank you for your order letter of July 4, 2001 with enclosures, the above-identified application was timely filed in the U. S. Patent and Trademark Office today (July 12, 2001) without an executed declaration.

Enclosed is a copy of the Preliminary Amendment as filed to cross reference the priority application..

[redacted]

Thank you for entrusting me with this case.

375 Park Avenue
17th Floor
New York, NY 10152-1799
212.521.5400
Fax 212.521.5450

Delaware
New Jersey
New York
Pennsylvania
Virginia
Washington, DC

reedsmith.com R020

ReedSmith LLP

I shall keep you promptly advised of all developments.

Enclosed is our Invoice in duplicate.

Very truly yours,

Jules E. Goldberg

JEG:ram

Enclosures:
Invoice
[redacted]

R021

EXHIBIT 7

****
*** TX REPORT ***
****

TRANSMISSION OK

TX/RX NO	1249
CONNECTION TEL	901181339854443
SUBADDRESS	
CONNECTION ID	
ST. TIME	07/05 15:14
USAGE T	00'49
PGS.	1
RESULT	OK

SUDA PATENT OFFICE

MEMBER OF A-I-P-P-I

MASAYOSHI SUDA PATENT ATTORNEY
NISSEI HIGASHI-IKEBUKURO BLDG.
11-1 HIGASHI-IKEBUKURO 1-CHOME
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TELEPHONE: 03-3988-4326
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July 4, 2001
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NEW YORK, N.Y 10152-1799.
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Attention: Jules E. Goldberg, Esquire

Your Ref: JG-SU-5072/500577.20035 Our Ref: ML6227US

Re : New U.S. Patent Application corr. to the Japanese Patent Applicat filed on Juln 18, 2001
Assignees: MITSUBISHI MATERIALS SILICON CORPORATION
MITSUBISI SILICON AMERICA CORPORATION

Dear Mr. Goldberg:

Please file a new Patent Application in your country **as soon as possible** though this application is a conventional case, of which deadline for claiming priority is June 18, 2002.

[redacted]

Please send us two copies of the filed documents with the filing certificate and your debit note.

[redacted]

R022

EXHIBIT 7

SUDA PATENT OFFICE

MEMBER OF A·I·P·P·I

MASAYOSHI SUDA PATENT ATTORNEY
NISSEI HIGASHI-IKEBUKURO BLDG.
11-1 HIGASHI-IKEBUKURO 1-CHOME
TOSHIMA-KU, TOKYO 170-0013, JAPAN

TELEPHONE: 03-3988-4326
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Attention: Jules E. Goldberg, Esquire

Your Ref: JG-SU-5072/500577.20035 Our Ref: ML6227US

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[redacted]

Please send us two copies of the filed documents with the filing certificate and your debit note.

[redacted]

R023

Please acknowledge a safety receipt of this letter by return facsimile.

Very truly yours,

SUDA PATENT OFFICE

Masayoshi Suda

MS/my

Encls.: 1) through 3) as stated

ML6227US

[redacted]

1. INVENTORS:

(1) NAME: Cindy Kohanek
ADDRESS: c/o MITSUBISHI SILICON AMERICA CORPORATION, 1351 Tandem Avenue N.E., Salem, Oregon 97303, U.S.A.

(2) NAME: Gary Babb
ADDRESS: c/o MITSUBISHI SILICON AMERICA CORPORATION, 1351 Tandem Avenue N.E., Salem, Oregon 97303, U.S.A.

2. ASSIGNEES:

(1) NAME: MITSUBISHI MATERIALS SILICON CORPORATION
ADDRESS: 5-1, Ohtemachi 1-chome, Chiyoda-ku, Tokyo 100-0004 Japan
REPRESENTATIVE: Naoyuki Hosoda (President)
NATIONALITY: Japan

(2) NAME: MITSUBISHI SILICON AMERICA CORPORATION
ADDRESS: 2445 Faber Place, Suite 100, Palo Alto California 94303-0912, U.S.A.
REPRESENTATIVE: Chet P. Brauch (Chairman & CEO)
NATIONALITY: U.S.A.

3. SORT OF ASSIGNMENT:

[redacted]

4. TITLE: LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION FLAT

5. PRIORITY:

(1) APPLICATION No.: 2001-183702 filed on June 18, 2001
COUNTRY: Japan
APPLICANT: MITSUBISHI MATERIALS SILICON CORPORATION
MITSUBISHI SILICON AMERICA CORPORATION

6. REMARKS:

(1) You are authorized to make modifications in the English text so as to bring it to conformity with the current practice.

(2) As to the future prosecution, you are requested to keep the instant case in force in the absence of our instructions.

EXHIBIT 7

****
*** TX REPORT ***
****

TRANSMISSION OK

TX/RX NO	0959
CONNECTION TEL	901181339864443
SUBADDRESS	
CONNECTION ID	
ST. TIME	06/07 16:58
USAGE T	01'07
PGS.	2
RESULT	OK

ReedSmith LLP

Jules E. Goldberg • 212.521.5403 • jgoldberg@reedsmith.com

VIA FACSIMILE & CONFIRMATION BY MAIL

Masayoshi Suda
Suda Patent Office
Shinseiwa Ikebukuro Bldg.
24-3 Higashi-Ikebukuro 1-chome
Toshima-ku, Tokyo 170-0013, Japan

June 7, 2001

Re: "LINEARITY MEASURING APPARATUS FOR WAFER ORIENTATION FLAT"
Inventors: Cindy KOKANEK and Gary BABB
Our ref.: JG-SU-5072/500577.20035

Dear Mr. Suda:

Pursuant to your instructions [redacted]

Also enclosed herewith is the [redacted]

Accordingly, you can proceed with preparing and filing the Japanese application.

Please let me know when you wish to file the actual U.S. Application or if you have any questions.

Our invoice is enclosed herewith.

Kind regards.

Very truly yours,

ReedSmith LLP

Jules E. Goldberg • 212.521.5403 • jgoldberg@reedsmith.com

VIA FACSIMILE & CONFIRMATION BY MAIL

Masayoshi Suda
Suda Patent Office
Shinseiwa Ikebukuro Bldg.
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Kind regards.

Very truly yours,

Jules E. Goldberg
JEG:ss
Encls.: [redacted]
Invoice by air-mail

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May 30, 2001

VIA FEDEX

Berlin & Associates
6001 Jefferson Highway, Suite 404
Arlington, VA 22205-3603

Re: [redacted]
Our file: 500577

Dear Lisa:

Thank you for your assistance on the phone today.

Enclosed please find [redacted]

Please [redacted]

Thank you in advance for your assistance. Please do not hesitate to contact me with any questions.

Sincerely,

Joe Teig
Sr. Patent Paralegal

enclosures

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New York, NY 10152-1799
212.521.5400
Fax 212.521.5450

Delaware
New Jersey
New York
Pennsylvania
United Kingdom
Virginia
Washington, DC

STATUS OF CLAIMS

ORIGINAL CLAIMS 1 TO
CLAIM NO.:

1	36
2	37
3	38
4	39
5	40
6	41
7	42
8	43
9	44
10	45
11	46
12	47
13	48
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